Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D. C. 20510

In the Matter of	)	
	)	
Implementation of Section 17	)	
of the Cable Television	)	ET Docket No. 93-7
Consumer Protection and	)	
Competition Act of 1992	)	
	)	
Compatibility Between	)	
Cable Systems and Consumer	)	
Electronics Equipment	)	

REPLY COMMENTS OF GENERAL INSTRUMENT CORPORATION

General Instrument Corporation ("GI") files these reply comments in the above captioned matter on the subject of compatibility between cable systems and consumer electronics equipment.

GI is a world leader in the manufacture and distribution of equipment for the cable television and satellite industries. Operating through its Jerrold, VideoCipher and Comm/Scope Divisions, GI supplies cable television subscriber and distribution products, satellite encryption technology and equipment, and coaxial and fiber optic cable. GI was also the first to propose and deliver for testing an all-digital advanced television system for selection as the United States terrestrial broadcast standard. Based on that technology, GI has developed and deployed NTSC digital compression products for the satellite industry. NTSC digital compression products have been ordered by a number of major cable system operators for deployment in 1994.

I. Summary

Innovation in the cable television industry and other industries depends upon an ability to deploy new features and services. Many innovations depend upon the capability to deploy new hardware on a uniform basis within a franchise area. Set top converters have been and continue to be an effective way of deploying innovative services. Coming innovations, such as digital television and multimedia integration, would be inhibited if the ability of the industry to continue to use converter technology were restricted.

Today's set top converters offer many consumer features that simplify recording of cable programs. They incorporate tuners to automatically switch channels, RF bypass capability, and are available in versions to simultaneously descramble two programs. Integrated remotes are available from cable equipment manufacturers and third parties which allow a single remote to control more than one device. Consumer electronics manufacturers also offer products which provide automated control of VCRs, televisions and cable converters.

In an environment of escalating attempts to defeat signal security, it is imperative that the cable industry maintain control of the descrambling technology and hardware. Signal security protects both the cable operator's revenue stream and the intellectual property rights of copyright holders. Cable operators need the ability to upgrade the security of their systems from time to time on a system-wide basis.

A revision of the multiport interface standard (EIA-563) accompanied by a definition of "cable ready" can provide the interface to descrambling devices in new cable ready televisions and VCRs. With appropriate revisions, the resulting standard can support the evolution to digital television as well as handle today's analog scrambling systems.

II. Set Top Converters Foster Innovation

The cable television industry and its suppliers continue to innovate in programming, delivery technology and new services. As examples, new services like electronic program guides and video-on-demand are being deployed today. Digital compression technology allowing over 500 channels to be distributed over today's cable systems will be in homes by mid-1994. Multimedia technology, integrating computers with video delivery, is now being developed.[1]

The introduction of innovative services depends upon the ability of cable operators to access and market to all the homes within a franchise without regard to the type of TV equipment within the homes. By selecting and deploying appropriate hardware for a particular franchise, the cable operator can coordinate this hardware investment with the most effective service offering for the system's consumers. The operator can deploy and

[1] This very week at the NAB Show in Las Vegas, GI and MicroSoft are conducting a real time demonstration of full motion video married to an interactive, Windows-type system which allows a consumer to manipulate program directories, call up video, place transactional orders, and retrieve information. Such systems will depend upon, and allow maximum utilization of, digital technology. They will make practical the integration of the computer and the television set.

upgrade this hardware widely and rapidly to launch new services. This benefits consumers, encourages investment, and contributes to economic growth.[2]

The use of set top converters has been the most efficient and effective method of providing enhanced capabilities to subscribers. These converters provide a consistent set of capabilities and a consistent consumer interface. These converters would interface most effectively to the television set or VCR at baseband for both the video and audio interface. However, because few TV sets today have baseband inputs, all converters sold today include an RF modulator to allow use with any TV or VCR that can tune channels 2, 3, or 4, regardless of whether it has baseband inputs. Digitally compressed services, planned for delivery within the next year, include the capability to provide CCIR-601 resolution allowing display of over 700 horizontal lines of resolution. This results in a higher picture quality than can be delivered in a conventional 6 MHz channel. The use of the baseband interface with separate luminance and chrominance inputs found in many large screen TV's (27 inch and larger) could eliminate many of the NTSC artifacts as well. The combined effect is significantly improved picture quality for the consumer.

The same is true of audio delivery. Today's cable systems deliver compact disk quality audio simulcasts of cable programming. Interfaced to the consumer's audio

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[2] EIA/CEG fails to acknowledge value in this innovation. For example, EIA/CEG in its comments complains "...the number of new channels delivered by cable systems represents a moving target." EIA/CEG Comments, p. 15. This sporting metaphor is inapt. We submit that encouraging new technology, new products, new investment and new jobs is a primary, if not overriding, policy goal of the Federal government.

equipment or audio inputs of the television receiver, the technology gives the consumer the advantage of surround sound digital audio without the constraints of the NTSC audio parameters. Use of the traditional NTSC delivery format would not support these capabilities.

We are only at the beginning of the digital television life cycle and one can expect further advances as the cost of digital video processing hardware declines, much as computer processing has over the last 20 years. It is reasonable to expect significant advances in digital technology over the 10-15 year life of the typical TV and this technology evolution would be inhibited by any limitation of digital technology to that incorporated only within television sets. Integration would freeze technological development or limit it to modes compatible with the installed base of television sets. By retaining digital technology in the set top converter, cable operators can install and upgrade the technology consistent with the

video compression in cable systems.[3] That proposal is contrary to the Commission's mandate under Section 7 of the Communications Act to promote new technologies, and is plainly inconsistent with the public interest.

Digital television, which includes the core technology of digital video compression, is an entirely new technology category which was initiated and invented by U.S. companies, which those companies currently have a world leadership role. For example, GI currently has its DigiCipher™ multi-channel NTSC satellite television system installed and operational at programmer sites in the U.S., Canada, Mexico, Latin America and Hong Kong.

To develop such technology requires significant investment on the part of manufacturers. General Instrument Corporation is spending approximately $75 million to bring its technology to market. Such technology investment can only take place in an environment where a manufacturer perceives an opportunity for a fair return.

Cable television providers now face competition from Direct Broadcast Satellite (DBS), microwave delivery services (MMDS and MLDS) and telco delivered video dialtone services using fiber optics or twisted copper pairs. None of these competitors face the

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[3] EIA/CEG Comments, p. 43. EIA/CEG, by proposing to stop the development of digital video compression in cable TV, has decided to favor the interests of those of its

hurdle of interfacing with a form of standard descrambling circuitry within the television or providing a clear signal to the home as proposed for the cable industry by EIA/CEG. To require the cable industry to meet such requirements places the industry at a significant disadvantage with respect to its ability to innovate with new services and technology.

A delay in the deployment of digital technology by cable television systems could place cable operators at a significant disadvantage vis-a-vis DBS operators who have announced the initiation of service early in 1994. It would also deprive cable subscribers, for whom DBS is not a preferred or practical alternative, of a full range of services. To deploy digital compression technology in a competitive time frame requires the product development activity to take place now and does not allow waiting for completion of a standards process based on government action or the involved procedures of standards setting bodies.

As digital video compression is introduced by satellite programmers, both at C-band and Ku-band, and most likely by MMDS operators, there is yet no indication whether a single standard or multiple standards will be employed for compression, modulation, and encryption, but there is no evidence that a single standard across all industries would best serve the public interest. The marketplace will eventually make its decisions on these matters, and we believe that the marketplace is better situated than the Commission or trade associations to make such decisions. The marketplace is best able to evaluate the relative costs and benefits of alternative approaches.

Some maintain that MPEG is developing such standards in the near term. MPEG in fact addresses only video and audio coding standards and the transport (packet structure) of that information. MPEG does not address conditional access (encryption or control), modulation, multiplexing or error correction, all of which are required to fully specify an interoperable digital program delivery system. MPEG has also chosen a video coding technique and is leaning toward an audio coding technique that together result in a bill of material cost increment for every decoder, whether a set top terminal or multiport module, of approximately $40 compared to General Instrument's DigiCipher II system using component costs forecast for late 1994. A $40 bill of material translates to a $60 to $80 increment in the manufacturer's sale price of the compression terminal. Industries and consumers which can benefit from digital compression need the flexibility to deploy technology that meets their needs on a cost effective basis. Compression technology will improve in the future and there is a need for flexibility to upgrade to the technology that is most cost effective at that future time.

IV. The Technology Exists to Support Enhanced Consumer Features

Today's converter technology has advanced significantly in its ability to support requirements for enhanced consumer features. Converters which incorporate RF bypass allowing non-scrambled channels to be tuned directly by the television tuner have been available for several years. Converters are available with a time controlled programming function which allows recording up to four successive programs regardless of channel or whether the program is scrambled. Remote controls which allow control of both the

converter and the television set from a single handheld unit are available from cable television equipment suppliers and third parties. Converters are also available which allow simultaneous watching and recording of two scrambled channels. These "Watch 'n' Record" converters even support picture in picture capability for two scrambled or non-scrambled channels without the need for a VCR to perform the tuning function for the second channel. Converters are available with On-Screen display which provides the on-screen readout of program services as well as channel number. They also provide Channel Guide functions and supplemental text information for each channel. The capabilities of current generation converters can satisfy the consumer compatibility requirements of the Cable Television Consumer Protection and Competition Act of 1992.

V. Security and Protection of Programmers' Property Requires That Cable Operators Maintain Control of Descrambling Circuitry

Security is a key parameter in the ability to access major events and early window motion pictures.[4] Different transmission media face different problems in maintaining such security; none are immune.[5] It is essential that the cable industry control its security

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[4] EIA/CEG has gone so far as to ask the Commission to "forbid" scrambling. EIA/CEG

technology and have the ability to restrict access to descrambling equipment and technology. Security techniques have evolved considerably since the first addressable converters. The technology began with sync suppression and evolved to gated sync suppression, then baseband techniques (video inversion) and most recently line manipulation techniques. Data streams containing the authorization information have evolved to include encryption of the authorization information. Pirates (those who illegally access cable programming) have become more sophisticated over time, requiring the continuing evolution of encryption techniques. This evolution can require a complete replacement of the hardware in the home and, in a cable television environment, cannot necessarily be accomplished by merely replacing some element such as a smart card in the system.

To maintain a competitive position in the acquisition of prime programming, the cable industry needs to control and upgrade as necessary the security of the programming it delivers. This can only be accomplished by the control of the descrambling circuitry. As the industry moves to digital program delivery, the security tools available for encryption of the programming are greatly enhanced. However, this does not lessen the need to be able to readily replace the technology in place should the need arise.

VI. Different Applications Require Different Video Compression Techniques

A group of VCR manufacturers is working to develop a standard for home digital video recording. Their efforts have culminated in a technique derived from digital broadcast

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protection is afforded by a multiplicity of encryption algorithms.

recording which employs a data rate over 30 Mbps. The technique chosen provides for display of fast forward and rewind pictures as well as support editing of the recorded program. In other words, they have optimized the technology for video recording. While this rate allows high quality digital recording, it is not a rate which would allow transmission of a single NTSC signal within a 6 MHz channel. Further, it is neither consistent with MPEG-2 or any other proposed transmission scheme for multichannel NTSC.

The cable industry plans to deploy technology in 1994 which will allow it to transmit 4 to 10 programs to the home in a 6 MHz channel using techniques optimized for transmission of entertainment video over cable and satellite transmission paths. These differing approaches can work together. An NTSC interface will allow the digital recorders to record a program delivered to the home in either analog or digital formats. For digital signals, conversion to analog and descrambling (as required) would be performed in a set top converter or multiport module, as described below.

VII. The Concept of a Standard Interface Continues to Have Merit

EIA standard 563 was developed jointly by the cable industry and the consumer electronics industry as a means of interfacing decoders to consumer electronics. While its initial deployment was less than successful, the concept still has merit. With modifications to the initial standard, a backward compatible interface can be developed which allows a television set or VCR control of an associated decoder module. A standard command set and communications interface can be developed by the cable and consumer electronics

industries to allow these control functions to include those associated with both analog descrambling and digital compression hardware. GI has developed analog multiport descramblers which comply with EIA 563 and has further committed to develop such an interface for its DigiCipher™ II compression system as part of its purchase agreement for digital compression terminals with Telecommunications, Inc. Modifications to EIA 563 could support tuning of channels beyond the tuning range of the associated television set by incorporating a tuner within the module. That tuner would be invoked by command from the television set and could, in the future, include a tuner meeting the phase noise requirements of digital transmission. This could reduce the cost of all "cable ready" television sets, many of which may not be used for reception of digital signals by eliminating the need for a digital-capable tuner in each set. A built-in bypass switch would allow seamless switching between those channels selected directly by the television and those selected by the multi-port module.

Compared to an entire converter, multiport descramblers would be less costly. Eliminating the tuner results in a $6-$12 bill of material cost reduction, yielding a $9-$24 reduction of product price depending upon the cost of the tuner, its size and the number of associated components which can be eliminated. Additional cost saving opportunities include elimination of the second remote, less costly cosmetic converter packaging, and possible consolidation of the power supply with the associated device. While a standard descrambler interface does not address the installed base of televisions and VCRs, it can provide an alternative for supporting scrambled and digital reception with new "cable ready"

televisions and VCRs.

VIII. Conclusion

The attention of the Congress and the Commission to the potential for increasing compatibility between consumer electronic equipment and cable television systems can yield beneficial results, but only if the Commission remains mindful of at least two important goals. These are the continued encouragement of innovation and new technologies and the continued protection of intellectual property. These ultimately give value to consumers and, upon that value, rests the value of consumer and commercial equipment manufacturers and cable television operators, among others.

Respectfully submitted,

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April 21, 1993